EAST - [default.wsp:1]

File View Edit Tools Window Help

Active
- L1: (47) CoFe near3 ferromagnetic and (spir
- L5: (49) CoFe near5 ferromagnetic and mag
- L6: (21) 5 not 1
- L7: (99) CoFe same ferromagnetic and magr
- L8: (50) 7 not 5
- L9: (71) 7 not 1
- L10: (50) 8 not 1

Search List Browse Queue Clear

DBs USPAT; US-PGPUB; JPO; IBM TDB

Plurals Synonyms

Default operator OR

Highlight all hit terms initially

BRS form IS&R form Image Text

| | Type | L # | Hits | Search Text | DBs | Time Stamp | Comments | Error |
|---|---|---|---|---|---|---|---|---|
| 1 | BRS | L1 | 47 | CoFe near3 ferromagnetic and (spin near2 valve or AMR) | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:18 | | |
| 2 | BRS | L5 | 49 | CoFe near5 ferromagnetic and magnetoresist$3 | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:20 | | |
| 3 | BRS | L6 | 21 | 5 not 1 | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:19 | | |
| 4 | BRS | L7 | 99 | CoFe same ferromagnetic and magnetoresist$3 | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:23 | | |
| 5 | BRS | L8 | 50 | 7 not 5 | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:20 | | |
| 6 | BRS | L9 | 71 | 7 not 1 | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:21 | | |
| 7 | BRS | L10 | 50 | 8 not 1 | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:21 | | |
| 8 | BRS | L11 | 128 | (CoFe or FeCo) same ferromagnetic and magnetoresist$3 | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:23 | | |
| 9 | BRS | L12 | 29 | 11 not 7 | USPAT; US-PGPUB; JPO; IBM TDB | 2001/12/13 09:23 | | |

Hits Details

Ready NUM

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ferromagnetic coupling of the two ferromagnetic layers 12, 16 through the layer 14 of nonmagnetic metallic material. Centering the response to zero field, as shown in the dashed line in FIG. 6, can be accomplished by several means. In an actual patterned structure, the magnetostatic interaction between the two ferromagnetic layers would tend to cancel the effect of coupling through the nonmagnetic metallic layer thereby centering the response. Another way of centering the response is by the appropriate choice of the magnitude and direction of the sense current. Another way of centering the response is by setting the easy axis of layer 12 at slightly more than 90 degrees with respect to the magnetization of layer 16. A further way of centering the response is by a small change in the angle between the magnetization in layers 12 and 16. Note that this response is very linear, is centered at zero field, and is sensitive to signals within the range encountered in magnetic recording applications. It can be seen that these characteristics make this an excellent magnetic field sensor for magnetic recording application.

DEPR:
The ferromagnetic layers 12, 16 can be made of any suitable magnetic materials such as Co, Fe, Ni and their alloys such as NiFe, NiCo, and FeCo, for example. The amplitude of the magnetoresistance varies with the thickness of the first thin film ferromagnetic layer 12 as shown in FIG. 7 for three selected magnetic materials Co, NiFe, and Ni. These three curves have very similar shapes characterized by a broad maximum between about 50.ANG. and 150.ANG., so this is the preferred range for the thickness of the first ferromagnetic layer 12.

CLPR:
1. The magnetoresistive sensor comprising:

CLPR:
2. A magnetoresistive sensor comprising:

CLPR:
3. The magnetoresistive sensor of claim 1 wherein said means for fixing the magnetization direction of said second layer of ferromagnetic material comprises providing said second layer of ferromagnetic material with a substantially higher coercivety than the coercivety of said first layer of ferromagnetic material.

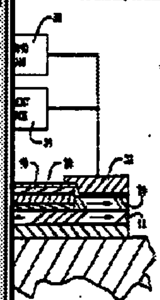
CLPR:
4. The magnetoresistive sensor of claim 1 wherein said means for fixing the magnetization direction of said second layer of ferromagnetic material

Details Text Image FRO+KWIC

[11] Patent Number: 5,206,590

[45] Date of Patent: Apr. 27, 1993

[57] ABSTRACT



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magnetoresistive response for a prior art spin valve MR sensor structure;

DRPR:
FIG. 5 is a graph illustrating the magnetoresistive response for the MR sensor shown in FIG. 2;

DRPR:
FIG. 9 is an exploded view in perspective of another preferred embodiment of the magnetoresistive sensor according to the principles of the present invention; and

DRPR:
FIG. 10 is an end view of another embodiment of a magnetoresistive sensor constructed in accordance with the present invention.

DEPR:
According to this preferred embodiment of the present invention, the ferromagnetic layers 31, 35 and 39 can be fabricated of any suitable magnetic material such as cobalt (Co), iron (Fe), nickel (Ni) and their alloys such as nickel-iron (NiFe), nickel-cobalt (NiCo) and iron-cobalt (FeCo ), for example. The non-magnetic metallic spacer layers 33 and 37 comprise copper (Cu), for example, or other suitable noble metal such as silver (Ag) or gold (Au) or their alloys. An MR sensor based on the spin valve effect wherein the sensor read elements comprises a ferromagnetic/non-magnetic/ferromagnetic layered structure is described in greater detail in the above referenced patent no. 5,206,590 hereby incorporated by reference as if fully set forth herein. The fixed or pinned outer ferromagnetic layers 31 and 39 can be exchange biased by adjacent layers (as shown in FIG. 9) of an antiferromagnetic material such as iron-manganese (FeMn), for example. An MR sensor based on the spin valve effect wherein a pinned ferromagnetic layer is exchanged biased by an adjacent antiferromagnetic layer is described in greater detail in the above referenced patent application Ser. No. 07/937,620 hereby incorporated by reference as if fully set forth herein. Alternatively, the magnetization directions of the pinned ferromagnetic layers 31, 39 can be fixed by use of an adjacent hard magnetic layer or by use of a material having a sufficiently high coercivity for the outer pinned layers 31, 39.

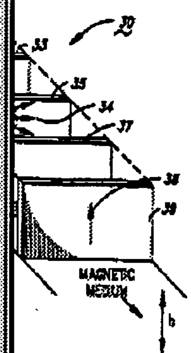
DEPR:
The structure of a conventional or single spin valve MR sensor as described in the above-cited patent applications is essentially FM.sub.free

[11] Patent Number: 5,287,238

[45] Date of Patent: Feb. 15, 1994

OTHER PUBLICATIONS

[57] ABSTRACT

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